IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of : Patch, Sarah K.

Serial No. : 10/800,957

Filed : March 15, 2004

For : METHOD AND SYSTEM OF THERMOACOUSTIC COMPUTED TOMOGRAPHY

Group Art No. : 3737

Examiner : Elmer M. Chao

CERTIFICATION UNDER 37 CFR 1.8(a) and 1.10

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REPLY BRIEF

Dear Sir:

Responsive to the Examiner's Answer dated November 18, 2010, please consider the following remarks:

REMARKS

The Examiner questioned the "specific interpretation of the word 'inadmissible'," and referenced the interviews conducted on both 10/12/2010 and 10/21/2010. *Id.*, pg. 9. Appellant again stipulates that "inadmissible" is defined in the Specification for example at Pg. 2 beginning at ln. 10. Appellant contests the assertion of the Examiner that "measurement surfaces located <u>in</u> <u>between</u> real transducer locations 14 of the bottom of the hemisphere bowl" (emphasis in original) (*Id.*, pg. 10) are not consistent with the claim. Figure 1 illustrates a sphere 10 that includes transducers 14 that are used to detect or receive ultrasonic waves. Clearly, positions along a surface of sphere 10 and <u>between</u> transducers 14 are not inadmissible, but instead are positions where transducers could also be positioned (they are not obstructed by positioning an object such as object 12 therein, as position 16 is). Thus, the positions <u>in between</u> transducer locations 14 are "admissible" transducer locations, contrary to the allegation of the Examiner.

Regarding the Examiner's response to the arguments regarding claim rejections (*Examiner's Answer*, starting pg. 10, bottom), Appellant emphasizes that Kruger and Bae et al., alone or in combination, do not teach or suggest the claimed subject matter. Kruger teaches arrangements of evenly spaced transducers when a breast is positioned in an imaging bowl, and image reconstruction with transducer data obtained therewith. *Kruger*, Col. 6, lns. 1-5, and lns. 18-20. Bae et al. is directed toward automated lung nodule detection from CT images. *Bae et al.*, Para. [0031] and FIG. 2. Bae et al. teaches that images are reconstructed and, if a reconstruction interval is larger than 1 mm, finer-resolution slices can be interpolated using neighboring slices. *Id.*, Para. [0054].

The Examiner alleged that "because Bae et al.'s 'second set of data' represents slices in between existing slice data, it is considered data that was previously associated with an 'inadmissible' area or 'surface.'" *Examiner's Answer*, 11/18/2010, pg. 11. However, this interpretation ignores the claims as a whole that call for, as example in claim 1, "determining a second set of <u>TCT data</u> from a first set of <u>TCT data</u> for a second inadmissible measurement surface." Thus, in this interpretation now posed by the Examiner, the Examiner's suggestion is based on reconstructed image data used for interpolation, and this is <u>not</u> interpolation of TCT data. Although Bae et al. arguably teaches interpolation of a second set of data (at the interpolation interval) from a first set of data (reconstructed slices), it is <u>not</u> TCT data that is being interpolated to do so. Rather, it is reconstructed data.

Related to claim 24, the Examiner alleged that Bae et al.'s interpolation would create a slice in between two existing slices of image data, which can be equivalently considered a 'mirrored' location of image data assuming that the mirroring plane is placed in between the newly generated slice data and one of the existing neighboring slice data. *Id.*, pg. 12. However, merely placing a mirror plane between two slices of reconstructed data does not teach or suggest "deriving a second TCT dataset from a first TCT dataset, the second TCT dataset including data for transducer locations mirrored from the first set of transducer locations," as called for in claim 24. This interpretation again fails to consider the claim as a whole and, in this case, the Examiner's 'mirrored' location is between reconstructed image slices and is not related to TCT data that is mirrored prior to image reconstruction.

The Examiner stated that the teaching of Bae et al. is "done before the final image reconstruction." *Examiner's Answer,* 11/18/2010, pg. 12. Appellant agrees that Bae et al. teaches conducting some steps before final image reconstruction. That is, Bae et al. teaches image reconstruction and, if the interval is larger than 1 mm, finer-resolution slices can be generated. Thus, Bae et al. is not directed toward manipulation of data prior to image reconstruction. Instead, Bae et al. teaches interpolation between reconstructed CT images to reduce a reconstruction interval. Kruger teaches acquisition of data and reconstructing that data, and if the reconstruction interval is too great, then Bae et al. would teach to interpolate the reconstructed data to obtain a smaller reconstruction interval. This is in contrast to the claimed subject matter, and does not teach or suggest, for instance, "determining a second set of TCT data from a first set of TCT data for a second inadmissible measurement surface" as called for in claim 1. Because Kruger teaches reconstruction, and because Bae et al. is directed toward manipulation of data after reconstruction (but before a final interpolation), the interpolation taught by Bae et al. is related to reconstructed image data and does not correspond to TCT data prior to image reconstruction.

The Examiner has suggested that, because Bae et al. teaches interpolation of data, this interpolation of data is at sensor locations that cannot be accessed or are mirrored. *Id.*, pg. 13. However, Appellant again emphasizes that this ignores the claims as a whole. Bae et al. teaches interpolation of image data after image reconstruction. However, neither Kruger, Bae et al., nor a combination thereof teach or suggest determining a second set of TCT data from a first set of TCT data for a second inadmissible measurement surface.

Summary

The Examiner has set for a number of arguments regarding the combination of Kruger and Bae et al. However, the Examiner has generally failed to consider the claims as a whole. As stated, Kruger teaches arrangements of evenly spaced transducers when a breast is positioned in an imaging bowl, and image reconstruction with transducer data obtained therewith. *Kruger,* Col. 6, lns. 1-5, and lns. 18-20. Bae et al. is directed toward automated lung nodule detection from CT images. *Bae et al.,* Para. [0031] and FIG. 2. Bae et al. teaches that images are reconstructed and, if a reconstruction interval is larger than 1 mm, finer-resolution slices can be interpolated using neighboring slices. *Id.,* Para. [0054]. Bae et al. does <u>NOT</u> teach or suggest interpolation of TCT data, but instead teaches interpolation of image data after a reconstruction step.

However, the claims clearly call for <u>first</u> determining a second set of TCT data from a first set of TCT data, and <u>then</u> reconstructing an image based on the first and second sets of TCT data. There is an inherent order to the steps called for in the claims. That is, data is acquired or obtained, and further data is determined or derived from the acquired or obtained data. These steps occur before image reconstruction, because the reconstruction steps make use of the acquired first set of TCT data <u>and</u> the determined second set of TCT data (claim 1).

In contrast, Kruger teaches image reconstruction based on acquired data, and Bae et al. teaches interpolation of image data if the reconstruction interval is too large. Thus, Kruger and Bae et al. combine linearly in that Bae et al. would teach a smaller reconstruction interval that is based on image data that was reconstructed in Kruger.

Further, the Examiner has grasped to find acquisition of data in "inadmissible" locations by asserting, for instance, that locations between slice data is itself "inadmissible." However, this interpretation ignores considering the claims as a whole. The "inadmissible" data called for in, for instance, claim 1, is based on acquired TCT data, whereas data interpolated between reconstructed images is not TCT data but is instead reconstructed image data.

Similarly, claim 13 calls for a computer programmed to derive, from acquired data, unacquired data for an imaging object for one or more locations inadmissible for sensor positioning due to positioning of the imaging object. Thus, sensors positioned <u>between</u> existing sensor locations are not inadmissible as alleged by the Examiner, and derivation of unacquired data from acquired data is a step that is clearly conducted prior to image reconstruction.

Likewise, claim 20 calls for a computer that is caused to determine coefficients of a polynomial that correspond to a position of a transducer, acquire TCT data, and from the coefficients, determine TCT data corresponding to a desirable transducer location about an

imaging object that is inadmissible to a TCT transducer. Claim 20 calls for a step of generating an image using at least the TCT data determined from the coefficients. Sensors positioned between existing sensor location are not inadmissible, and the TCT data coefficients used for image reconstruction are clearly obtained prior to image reconstruction.

Also, claim 24 calls for deriving a second TCT dataset from a first TCT dataset. This, likewise, is not taught nor suggested in the art of record. Thus, in one sense, it is not even necessary to address the question of the definition of "mirrored" transducer locations raised by the Examiner. And, regardless, such steps are clearly conducted prior to the step of image reconstruction because claim 24 calls for generating an image using at least <u>the second TCT dataset</u>.

Therefore, in light of at least the foregoing, Appellant respectfully believes that the present application is in condition for allowance. As a result, Appellant respectfully requests timely issuance of a Notice of Allowance for claims 1, 2, and 4-26.

Applicant appreciates the Board's consideration of these Remarks and respectfully requests timely issuance of a Notice of Allowance.

Respectfully submitted,   Respectfully submitted,

/Kent L. Baker/   /Paul M. Ratzmann/

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